

Selby

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WHAT IS CLAIMED IS:

1. A method of forming a metal gate electrode having a silicon layer, a conductive barrier layer and a metal layer, the method comprising the steps of:

forming a metal gate electrode pattern comprised of the silicon layer, the conductive barrier layer and the metal layer; and

performing a selective oxidation process to the metal gate electrode pattern in a nitrogen containing gas ambient.

2. The method according to claim 1, wherein the nitrogen containing gas includes one or more gases out selected from the group consisting of nitrogen, nitrogen monoxide, nitrogen oxide and ammonia.

15 3. The method according to claim 1, wherein the nitrogen containing gas suppresses oxidation of the conductive barrier layer and the metal layer.

20 4. The method according to claim 1, wherein the nitrogen permeates a metal oxide layer which is formed during the selective oxidation process on a surface of the conductive barrier layer and the metal layer, the nitrogen decreasing surface mobility of the metal oxide layer and preventing formation of nucleation cites of whiskers on the metal oxide layer.

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5. The method according to one of claims 1 through 4, wherein oxygen gas and hydrogen are used as a source gas in the selective oxidation process.

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